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2862

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No. : 09/884,219

Applicants : Kars-Michiël Hubert Lenssen;  
Antonius Emilius Theodorus Kuiper

Title of Invention : MAGNETO-RESISTIVE DEVICE WITH A  
MAGNETIC MULTILAYER STRUCTURE

Date Filed : June 19, 2001

T.C./AU : 2862

Examiner : STRECKER, Gerard R.

Docket No. : NL 000361

*fee only*

Mail Stop Non-fee Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

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AMENDMENT

Sir:

This is responsive to the Office Action dated August 26, 2003, in connection with the above-referenced patent application.

Amendment to the claims is reflected from a complete list of the claims starting from

Page 2. Only claim 1 is amended in this response.

7/17/2004 KDUNCAN 00000001 110223 09884219  
le Ref: 00000001 DAH: 110223 09884219  
FC:1251 110.00 DA

Adjustment date: 06/04/2004 EEKUBAY1  
03/17/2004 KDUNCAN 00000001 110223 09884219  
01 FC:1251 110.00 CR

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

Kars-Michiel Hubert Lenssen et al.

Group Art Unit: 2862

Application No.: ~~09/844,219~~ 09,884,219

Examiner: Gerard R. Strecker

Filing Date: June 19, 2001

For: MAGNETO-RESISTIVE DEVICE WITH A  
MAGNETIC MULTILAYER STRUCTURE

**REQUEST FOR REFUND**

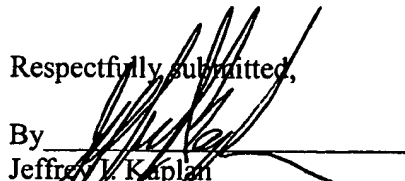
Mail Stop 16  
Commissioner of Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

A review of our Deposit Account Statement showed a withdrawal of \$110.00 regarding the above-identified patent application, a fee for a one-month extension petition (copy of statement enclosed). We believe this fee was deducted in error from our Deposit Account No. 11-0223. An Office Action was mailed on August 26, 2003 in the above-identified patent application. Applicants' amendment has a certification of mailing of November 25, 2003, a copy of which is attached. Applicants' response to the Office Action was submitted within the three-month due date of November 26, 2003 and thus does not require a one-month extension petition. Kindly credit our Deposit Account No. for \$110.00

Dated: April 30, 2004

Respectfully submitted,

By   
Jeffrey I. Kaplan  
Registration No.: 34,356  
KAPLAN & GILMAN, L.L.P.  
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Attorneys for Applicant

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Dated: April 30, 2004

Signature: 

Print Name: Jeffrey I. Kaplan



**United States  
Patent and  
Trademark Office**



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**Requested Statement Month:** March 2004  
**Deposit Account Number:** 110223  
**Name:** KAPLAN & GILMAN  
**Attention:**  
**Address:** 900 ROUTE 9 NORTH  
**City:** WOODBRIDGE  
**State:** NJ  
**Zip:** 07095

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03/12	69	10759615		9204	-\$876.00	\$3,227.00
03/17	1	09884219	NL 0 0 0 3 6 1	1251	\$110.00	\$3,117.00
03/19	113	PCT/US04/07855	489/2/PCT	1602	\$700.00	\$2,417.00
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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

**Application No.** : 09/884,219  
**Applicants** : Kars-Michiel Hubert Lenssen;  
Antonius Emilius Theodorus Kuiper  
**Title of Invention** : MAGNETO-RESISTIVE DEVICE WITH A  
MAGNETIC MULTILAYER STRUCTURE  
**Date Filed** : June 19, 2001  
**T.C./AU** : 2862  
**Examiner** : STRECKER, Gerard R.  
**Docket No.** : NL 000361

**Mail Stop Non-fee Amendment**  
**Commissioner for Patents**  
**P.O. Box 1450**  
**Alexandria, VA 22313-1450**

**AMENDMENT**

Sir:

This is responsive to the Office Action dated August 26, 2003, in connection with the above-referenced patent application.

Amendment to the claims is reflected from a complete list of the claims starting from Page 2. Only claim 1 is amended in this response.

Amendment to the claims:

1. (Currently Amended) A magneto-resistive device comprising a substrate which carries a free and a pinned ferromagnetic layer separated by a non-magnetic spacer layer therebetween for providing a magnetoresistive effect, said pinned layer comprising an artificial antiferromagnet layer system (AAF), and an exchange biasing layer, the AAF layer system including at least one CoFe layer, the exchange biasing layer being adjacent to and magnetically influencing the AAF layer system, wherein the free and the pinned ferromagnetic layers are separated by a Cu-type layer, the Cu-type layer on one side both sides being contiguous with a CoFe layer of the free ferromagnetic layer, and on another side being contiguous with the CoFe layer of the AAF system.
2. (Previously Cancelled).
3. (Previously Amended) A device as claimed in claim 1, in which the AAF layer system has an odd number of non-adjacent ferromagnetic layers greater than or equal to three.
4. (Previously Amended) A device as claimed in claim 3, in which the AAF layer system includes three non-adjacent ferromagnetic layers and two intermediate non-magnetic layers, and all said three ferromagnetic layers are CoFe layers.
5. (Previously Amended) A device as claimed in claim 1, in which the exchange biasing layer is arranged between the substrate and the AAF layer system.
6. (Previously Amended) A device as claimed in claim 3, wherein each of said non-adjacent ferromagnetic layers comprises a stack of ferromagnetic layers.

7. (Previously Amended) A device as claimed in claim 6, wherein at least two ferromagnetic layers towards the outside of the stack are thinner than a ferromagnetic layer towards the center of the stack.
8. (Previously Amended) A device as claimed in claim 6, wherein at least two ferromagnetic layers towards the outside of the stack are thicker than a ferromagnetic layer towards the center of the stack.
9. (Previously Amended) A data storage system including a magneto-resistive device according to claim 1.
10. (Previously Amended) A magnetic memory including a magneto-resistive device according to claim 1.
11. (Previously added) A device as claimed in claim 4, wherein each of the intermediate layers of the AAF is a Ru layer.

### REMARKS

This is responsive to the Office Action dated August 26, 2003 in which the Examiner rejects all pending claims 1 and 3 -11 as being obvious over combinations of Gill (US Patent No. 6,275,363), Gill (US Patent No. 6,219,209), Olivas et al (US Patent No. 6,507,187), Sano et al (US Patent No. 6,430,012) and Sasaki et al (US Patent No. 6,563,681). Applicants have further amended claim 1 to distinguish, in clearer language, the present invention from the cited prior art. Applicants respectfully traverse the rejections based on the amended claim as well as the detailed explanation below.

In particular, Applicants respectfully disagree with the assertion of the Examiner that the present invention is obvious over the combinations of the cited patents. As described in the application, the present invention discloses magneto-resistive device comprising a free and a pinned ferromagnetic layer separated by a Cu-type separation layer. The pinned ferromagnetic layer comprises an artificial antiferromagnet layer system (AAF). In particular, the AAF layer system comprises at least one CoFe layer, and the Cu-type separation layer is contiguous on both sides with a CoFe layer. The amendments to claim 1 clarify that the Cu-type separation layer is contiguous on one side with a CoFe layer of the free ferromagnetic layer, and is contiguous on another side with the CoFe layer of the AAF layer system of the pinned ferromagnetic layer.

Claim 1 has been amended to more clearly define the above-underlined distinguishing features. As explained below, these features cannot be obtained from the combinations of the cited patents.

The Gill patents (US Patent Nos. 6,275,363 and 6,219,206) teach a tunnel junction sensor which comprises an AP pinned structure having multiple CoFe layers, which are separated from an AP coupled free layer by a barrier layer which includes an oxide layer and a Cu layer (see the '363 patent, Figure 12). The Gill patents, however, do not teach that the Cu layer is contiguous



to any of the CoFe layer of the pinned structure, as defined in amended claim 1. In fact, the Cu layer in the Gill patents is NOT contiguous with CoFe layer of the pinned structure. To the contrary, the Gill patents teach that the Cu layer is placed between the oxide layer and the free layer so as to improve the biasing of the free layer structure and promote symmetrical read-back signals (col. 8, lines 34-45, of the '363 patent).

Applicants respectfully disagree with the assertion of the Examiner that combining the Gill patents with the other cited patents renders the present invention obvious. In particular, none of the other three cited patents Olivas et al (US Patent No. 6,507,187), Sano et al (US Patent No. 6,430,012) or Sasaki et al (US Patent No. 6,563,681) discloses a pinned ferromagnetic layer that comprises an AAF layer system which includes at least one CoFe layer. Therefore, none of these three patents can provide a teaching or suggestion that the Cu layer, which separates the pinned layer and the free layer, is contiguous with a CoFe layer of an AAF layer. Thus, the applicants submit that no combinations of the teachings of these patents and the Gill patents can result in a Cu layer is contiguous with the CoFe layer of the AAF layer system, as recited in amended claim 1. Moreover, there is no motivation or suggestion in any of the cited patents for a combination that would result in the present invention as defined.

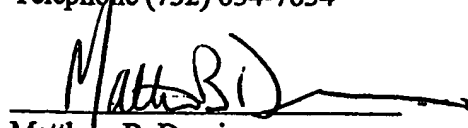
Therefore, Applicants believe that amended claim 1 is not obvious over any combinations of the cited patents, and thus is believed patentable. At least for the same reasons, Applicants submit that dependent claims 3-11 are also patentable as each of them includes all the features in claim 1.

Thus, the applicants respectfully request reconsideration and allowance of the application in view of the amendment and above explanations. The Examiner is authorized to deduct any fees believed due from our Deposit Account No. 11-0223.

Respectfully submitted,

KAPLAN & GILMAN, L.L.P.  
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Woodbridge, NJ 07095  
Telephone (732) 634-7634

DATED: November 25, 2003

  
Matthew B. Dernier  
(Reg. No. 40,989)

**CERTIFICATE OF MAILING**

I hereby certify that this correspondence is being deposited with the United States Postal service as first class mail, in a postage prepaid envelope, addressed to Mail Stop Non-fee Amendment, Commissioner for Patents, Washington, D.C. 20231 on November 25, 2003.

Dated November 25, 2003 Signed Fern Pekarofski Print Name Fern Pekarofski